Proposed Amendments for Consideration

Please amend the claims as follows:

Claims 1-40 (canceled)

Claim 41. (currently amended) A method for correlating a vehicle with the road on which it travels based on cellular communication, the method comprising the steps of:

gathering a sequence of cellular network events related to ~~a~~ one or more mobile units ~~from the cellular network~~, ~~together with~~ and ~~the~~a ~~road~~ physical, geographically-defined, accurate location of ~~the~~ each mobile unit~~s~~ determined by a physical geographically-defined, accurate location determination system ~~at the timing of~~when ~~these~~ each cellular network event occurs, such cellular network events and physical, geographically-defined accurate locations being gathered~~s~~ during one or more drives and then stored as entries in ~~as a location reference and creating~~ a learnt database as a location reference; and

conducting analysis of a new sequence of cellular network events ~~data generated from communication with~~related to ~~another~~ a particular mobile unit, the new sequence of cellular network activity events being gathered during~~on~~ a new drive ~~that does~~and is independent of physical, geographically-defined ~~not contain a~~ location ~~reference~~ information, in conjunction with the learnt database to ~~match~~correlate ~~a~~ the new sequence of cellular network ~~reports~~ events to a ~~specific route~~physical geographic location;

whereas the new ~~data~~ sequence of cellular network events is extrinsically collected from the base stations or the controllers or main switching systems or communication links between them~~;~~ and

whereas the data is processed to overcome the problem of similar sequences for neighboring routes.

Claim 42. (currently amended) The method ~~as in~~ of claim 41, wherein the sequence of cellular network events may include a handover event and wherein~~as~~ the step of gathering a sequence of cellular network events further comprises the step of:

clustering handover chains in the learnt database according to a similarity algorithm so that each cluster contains at least similar N chains (N<=M, N=>1), where N and M may vary for different route sections.

Claim 43. (currently amended) The method ~~as in~~of claim 42, where~~in~~~~as~~ the similarity algorithm comprises the step of:

each of the chains in a cluster of L cells has at least K (K<=L) cells that appear in the same order as in a header, where ~~as~~ K and L may vary for different route sections.

Claim 44. (currently amended) The method ~~as in~~of claim 42, where~~in~~ ~~as~~ ambiguous chain clusters, which are clusters in which at least one of the chains has similarity to chains related to a different route section, are filtered.

Claim 45. (currently amended) The method ~~as in~~of claim 44, where~~in~~ ~~as~~ clusters have similarity if at least for one of the chains within a first cluster, ~~(1st cluster)~~ another chain is found in a second~~nother chain~~ cluster ~~(2nd cluster)~~ that ~~includes at least J (J<=L) cells that appear in the same order, and this chain relates to a different route section than the first~~ ~~second~~ cluster, where ~~as~~ J and L may vary for different route sections, ~~and, if the first and~~ second cluster have similarity, both clusters are filtered.

Claim 46. (currently amended) The method ~~as in~~of claim 44, where~~in~~ ~~as~~ a cluster has similarity to a raw data chain if at least for one of the chains within the ~~a~~ cluster, another chain is found in the raw data that includes at least J (J<=L) cells that appear in the same order, and this chain relates to a different route section than the cluster, where ~~as~~ J and L may vary for different route sections, and, the ~~chain~~ cluster having similarity is filtered.

Claim 47. (currently amended) The method ~~as in~~of claim 41, where~~in~~ ~~as in the learning phase in the learning phase~~the step of gathering a sequence of events includes calculating ~~the~~ an accuracy level of a handover ~~is calculated~~ in one or a combination of the following ways:

using signal strength measurements to detect sharp decays in signal strength resulting in a handover and thus determine handovers accuracy level;

measuring the location spread of handovers between the same cells for different trips over the same route to determine handover accuracy level and average location.

Claim 48. (currently amended) The method ~~as in~~of claim 41, where~~in as~~ the step of conducting analysis ~~stage~~ further comprises ~~of~~:

matching ~~cell~~ chains from new drives to the learnt database by searching for a chain of J cells that has at least K (K<=J) cells that appear in the same order, both in a chain from the new drive as well as in a chain from the learnt database, whereas J and K may vary for different route sections;

assigning the route of the chain from the learnt database to the new chain that was matched.

Claim 49. (currently amended) The method ~~as in~~of claim 48, where~~in as~~ the step of conducting analysis ~~stage~~ includes a secondary matching procedure comprising the step of matching cells before and after the match ~~we have~~ previously detected ~~in the initial stage~~ by following ~~the~~ raw data chains in the learnt database backward and forward relative to the matched chain and looking for an L out of M (L<=M) cells match where as M is typically smaller than J, where as L and M may vary for different route sections.

Claim 50. (currently amended) The method ~~as in~~of claim 41, where~~in as~~ the step of conducting ~~an~~ analysis ~~is conducted to~~ detects the vehicle location ~~in~~ at specific points along the route ~~comprises of~~ by:

extracting ~~matching~~ handover~~s (cell pairs)~~ information comprised of cell pairs, physical geographically-defined ~~of a new chain (~~location, timing, and accuracy information~~)~~ from handover chains in the learnt database that match a new chain of handovers~~that were matched with it~~; and

calculating location and accuracy of handovers in the new chain of handovers according to the handover~~s~~ information ~~from the~~ extracted ~~chains~~ from the learnt database that relate to the same route section and contain the same cell pairs.

Claim 51. (currently amended) The method as in claim 41, where ~~as~~ in the step of conducting analysis ~~phase after a vehicle is~~to correlate~~d~~ the new sequence of events to a specific route ~~with the road it travels on~~, further comprises conducting analysis ~~is conducted~~ to detect traffic incidents ~~as follows~~by:

if ~~the~~ another mobile unit is in a call ~~has not ended yet~~ and no new handovers have been received for a time T, ~~the~~ a distance D to ~~the~~ a farthest possible handover location to a possible next cell is used to calculate ~~the~~ a maximal possible

speed at ~~the~~ a current route section as follows: Max Speed <= D/T and if this speed is below a speed threshold S then a possible incident report is issued for this route section.

Claim 52. (currently amended) The method as in claim 41, wherein ~~as~~ the step of conducting analysis ~~of new drives~~ is ~~conducted~~ based only on cell ID data.

Claim 53. (currently amended) A method for correlating a vehicle with the road on which it travels based on cellular communication, the method comprising the steps of:

gathering a sequence of cellular network events ~~from the cellular network~~ related to one or more~~a first~~ mobile units, ~~together with the~~and a physical, geographically-defined, accurate location of ~~the first~~each mobile unit~~s~~ ~~at~~ when ~~the timing of these~~ each event occurs~~s~~, and storing ~~s a location reference and~~ this information into~~creating~~ a learnt database as location references; and

conducting analysis of a new ~~data~~ sequence of cellular network events related to~~generated from communication with another~~ ~~another~~a particular mobile unit on a new drive ~~that does not contain a location reference~~independent of the physical, geographic location of the particular mobile unit in conjunction with the learnt database to identify a match ~~a sequence of reports to a specific route~~;

wherein~~as~~ the ~~data~~ new sequence of cellular network events is processed to overcome the problem of similar sequences for neighboring routes; and

wherein ~~as~~ the step of conducting analysis is ~~conducted~~ based on extraction of handover related messages, only from the communication links between the switch and the base station controllers in a cellular network.

Claim 54. (currently amended) The method as in claim 41, wherein ~~as~~ the step of conducting analysis is ~~conducted~~ based on extracti~~o~~ng ~~of~~ new events from ~~only~~ a~~different~~ different percentage of ~~the~~ calls ~~out of~~in different parts of the cellular system.

Claim 55. (canceled)

Claim 56. (currently amended) ~~A~~ The method of~~as in~~ claim ~~41~~42, wherein ~~as~~ the step of conducting analysis further ~~stage~~ comprises ~~of~~:

matching ~~cell~~ handover chains from new drives to handover chains in the learnt database; and

filtering out new handover chains that were matched with handover chains in the learnt database which represent more than one route section

Claim 57. (currently amended) The method according to claim ~~41~~42, where ~~as~~in the step of conducting analysis ~~is conducted~~ includes~~to~~ detecting ~~vehicle~~ physical geographic locations of mobile unit ~~in~~ at specific points along ~~the~~ a route~~, the analysis comprising the steps of~~by:

extracting ~~matching~~ handover~~s~~ ~~(cell pairs)~~ information ~~of a new chain~~ including cell pairs, physical geographically-defined ~~(~~location, timing, and accuracy information~~)~~ from handover chains in the learnt database for a new handover chain that ~~were~~ includes cell pairs that match~~ed~~ with ~~it~~cell pairs in the handover chain in the learnt database~~.~~; and

calculating the physical geographic location and accuracy of handovers in the new handover chain~~-~~ according to the handover information~~s~~ ~~from the~~ extracted ~~chains~~ from the learnt database that relate~~s~~ to the same route section and contain~~s~~ the same cell pairs.

Claim 58. (currently amended) The method according to claim 57, where ~~as~~in the physical geographically-defined location, timing ~~in time~~ and accuracy ~~level~~ information is further used to calculate traffic speed per each route section.

Claim 59. (currently amended) The method according to claim 57, where~~in as~~ the physical geographically-defined location ~~in,~~ timing~~e~~ and accuracy ~~level~~ information is used to detect traffic incidents.

Claim 60. (currently amended) The method ~~according to~~of claim 41, where~~in the step of conducting as~~ analysis ~~is conducted to~~ detect~~s~~ traffic incidents ~~, the analysis comprising the steps of~~by:

collecting handover~~'s~~ time density information for each route section;

alerting ~~on~~ of probable incident~~s~~ whenever the handover time density of a new chain~~s~~ decreases rapidly.

Claim 61. (currently amended) The method ~~according to~~of claim 41, where~~in as~~ the step of conducting analysis ~~is conducted to~~ detect~~s~~ incident clearance~~. This analysis comprises of~~ by:

collecting handover~~'s~~ time density information for each route section; and

notifying ~~on~~ of incident clearance whenever, after an incident, the density of new chains increases significantly.

Claim 62. (currently amended) The method ~~according~~ of~~to~~ claim 41, where~~in as~~ the step of conducting analysis ~~is conducted to~~ detects traffic speed~~, the analysis comprising the step of~~ by:

including a calibration stage in which traffic speed of a route section is correlated with the rate of handovers for this route section ~~on~~ at the same time; the handover~~s~~ rate is measured continuously and by comparing to the handover rate ~~of handovers~~ in the calibration stage the speed for the route section is extracted.

Claim 63. (previously presented) A method for correlating a vehicle with the road it travels on based on cellular communication, the method comprising the steps of:

collecting handover sequences statistics for a relevant area;

collecting road traffic volume information for each route in the relevant area from external sources for roads that differ in traffic conditions;

assigning handover sequences to routes according to volume comparison analysis; and

conducting analysis of new handover sequences from new drives in the relevant area in conjunction with the previously collected handover and traffic volume information to identify a route at certain time points during cellular phone calls.

Claim 64. (currently amended) The method ~~as in~~of claim 41, where~~in as~~ the ~~method~~ step of conducting analysis is performed ~~is used~~ for areas ~~where~~ in which at least ~~2~~ two roads are covered, at least partially, by the same ~~2~~ two or more cells.

Claim 65. (currently amended) The method ~~according~~ of~~to~~ claim 41, where~~in as~~ virtual sensors detect the speed at certain specific locations across routes within ~~the~~ a covered area and emulate the communication protocol between traditional road sensors and the control center in a hybrid traffic control system.

Claim 66. (currently amended) The method ~~according to~~of claim 41, where<u>in</u> ~~as~~ <u>the step of conducting analysis</u> further ~~analysis is conducted to~~<u>comprises</u> continuously updati<u>ng</u>~~e~~ the learnt database~~, the analysis comprising the steps of~~ <u>by</u>:

estimating the <u>physical geographic</u> location of handovers within matched sequences that do not appear in the database; and

adding new matched sequences to the learnt database

Claim 67. (currently amended) The method according to claim ~~41~~42, where<u>in the step of conducting analysis</u> ~~as~~ further ~~analysis~~ <u>comprises</u>~~is conducted in order to~~ detecti<u>ng</u> changes in the cellular system and adjusti<u>ng</u> the learnt database <u>by</u> ~~as follows~~:

monitori<u>ng</u> ~~during the operational stage~~ <u>the matching rates of</u> chains or clusters <u>of chains</u> ~~that their rate of matching~~ <u>with chains in the learnt database to detect</u> decreases <u>in the matching rates</u>~~significantly or are not matched at all~~;

find new clusters that were rarely matched or not matched at all, that appear in the same locations, according to preceding or following chains; and

compare statistics of <u>the</u> number of matches per cluster and find new clusters to replace clusters that are rarely matched.